

like ordinary water. The other two had no pitchers on them still sealed, and not being too adventurous, I resisted the temptation to sample these.

Since returning home, I have been told that actually five different Nepenthes grow in Singapore, the other two being two crosses - a Nepenthes hookeriana and another natural hybrid. Perhaps the round-leaved one was one of these. However, I wrote away inquiring about these two plants and managed to get in contact with the Garden's chief specimen collector, Mahmud. In his reply, he informed me: "There is a Nepenthes hookeriana not in Singapore but in Borneo and Malaysia." Unfortunately he makes no mention of the other one. Just who is right I do not know. Mahmud has been working for the Gardens for 27 years and is extremely knowledgeable about all types of plants. The botanist has an M.Sc. and at the time I was speaking to her she did not know of them. However, the existence of another two Nepenthes on Singapore comes from a paper written in the early 1960's on an analysis of Singapore's Nepenthes by Sally Green.

The Botanic Gardens at Singapore in an effort to increase its collection of carnivorous plants has expressed a willingness to swap the local Nepenthes for other carnivorous plants. If you would like to obtain plants or seed, write to: Miss S.Y.Geh, Botanic Gardens, Cluny Road, Singapore 10, Republic of Singapore.

FIELD OBSERVATION OF WINTERING UTRICULARIA VULGARIS
by A. Roger Kirby

While passing through northern Virginia on a recent trip to Maryland, I spotted several swampy areas that I felt needed a closer look for any CP's that might be there in winter bud. After marking the mileage from different points, I continued on, planning to stop on my way back.

Leaving Maryland on Monday morning, I drove into Virginia and proceeded to one of the areas I had marked by mileage. Upon arriving at the first bog I noticed the bog had little water in it for this time of year. I slipped on my hip boots, grabbed a five gallon bucket and walked into the shallow water and mud of the swamp. I immediately noticed Utricularia all over the bottom of the bog. I started gathering and putting them into the five gallon bucket. The plants were approximately twelve inches long, or six inches on each side of their "Y" form, and at the crown was the dark green whorled winter bud. I gathered the plants until I had the five gallon bucket about one-third to one-half full. I left the swamp for the car and I checked my watch and realized I had only taken twelve minutes to do all I did. I looked closer at the Utricularias and recognized them to be U. vulgaris because of the very large bladders, some 1/8" long in size, or 4-5 mm. x 2 mm. wide.

I had only covered a few square yards and due to the enormity of the swamp, it would take a full day to check it out more thoroughly for additional species of CP's.

I now plan to return in the spring to take a closer look when the plants are in bloom. I feel more Utricularia species are there and I also plan to take pictures. This seems a great place for CP enthusiasts, so I will let CPN know of my progress.

OBSERVATIONS OF TRICHOPTILUS PARVULUS AND DROSERA
by Grady Lucas

It seems that not all insects will succumb to the carnivorous nature of Drosera. One of these insects is the caterpillar of the moth Trichoptilus parvulus. This moth is a fairly small representative of the phylum pterophoridae, or "plume" moths.

Although many insects are known to be associated with Sarracenia and other carnivores, few are known to be associated with Drosera. There have been reports of a moth larva of the family Noctuidae which might feed on the plant, but these apparently crawl only on the glandless portions of the plant. Certain Australian Hemiptera of the family Capsidae are said to feed on the juices of arthropods caught by Drosera and are able to move about the leaves without any apparent difficulty.

After hatching from their eggs the larvae are no more than 1.5 mm. long, and their larval life will usually last about eight days.

Usually the first sign of Trichoptilus is that the leaves seem to have been chewed away, and pellets which look like fecal matter litter the surface of the leaves. The caterpillars apparently stay hidden under the sphagnum moss during the day and come out at night to feed.

The main food of the younger larvae seems to be the stalked gland itself, whereas the older larvae will not stop at just the stalk and will usually eat the leaf blade as well. They may also eat the remains of captured insects. It may take from 10-20 minutes for a

larva to eat a single stalk. Once finished with this stalk it will move on to an adjacent one and continue. In this manner an entire leaf can easily be stripped in a few hours. For some reason, the longer marginal glands are either ignored or eaten last.

The larvae are usually a grayish-brown in color, though the color can vary considerably depending on what material the larva has been eating and which can be seen through the semi-translucent body wall. Therefore, younger larvae tend to be red or purple, from eating the stalked gland, whereas the older larvae are greenish due to the color of the ingested leaf blade.

How does the larva avoid being trapped in the secretion? This is not as difficult as it seems. The body of the larva hardly ever touches the secretion, and if it did, it would become entrapped just as any other insect would be. The caterpillar's contact with the droplets is restricted to its bristles which stick out from its body. The bristles can readily be withdrawn from the secretion. Older larvae avoid body contact but because of their great size can escape without difficulty.

Pupation usually occurs on the flower stalk. The pupae which are light green in color, hang head down from the floral stalk and the adult emerges 10-12 days later.

A good deal remains to be learned about Trichoptilus parvulus. For instance, one wonders how the female lays her eggs on the plant without becoming entrapped herself. Of course, she could lay her eggs beside the plant, but the possibility that she oviposits directly on the plant need not be ruled out. It has been found that moths are among the most unlikely of all insects to be captured by Drosera, although I have seen it happen several times. The detachable scales with which moths are characteristically covered and which are known to protect them from adhesion to spider webs might also be why they are so seldom caught by Drosera. When a moth flutters into the leaf of Drosera, it merely releases some of the scales to the viscid secretion and flies on. Adult Trichoptilus must therefore be able to easily approach Drosera with at least some measure of caution.

PYGMY DROSERAS

by Rich Sivertsen

Pygmy Droseras are not necessarily characterized by small size, but primarily by their ability to produce gemmae. They are the only Droseras that do so. Except for D. pygmaea which extends into Tasmania, New Zealand and neighboring islands, all pygmy Droseras grow in southwestern Australia.

In cultivation, seeds are often difficult to obtain in spite of the plants' prolific flowering habit; and the seed is even more difficult to germinate and grow plants to maturity. Methods of propagating these plants from cuttings are not reliable, and are possibly damaging to the parent plant.

The best way to propagate these plants is to encourage, harvest and use gemmae. In constant temperature-light conditions, they will grow for years and produce an abundance of flowers periodically, but generally few or no gemmae. The stimulus needed is the transition from warm temperatures (70-85°F.)--low intensity light environment (such as a fluorescent light chamber) into a cool (38-65°F.)--high intensity light, or full direct sunlight for at least three to four hours daily. Some species may require an even longer photoperiod to produce gemmae.

During gemmification, the first noticeable changes in the plants is swelling of the apex in the center of the rosette. Within a week to ten days, gemmae will be visible within the apex as it opens up to form a nestlike cluster. These gemmae should now be carefully removed and pushed just below the surface of moist peat and placed under a controlled environment, such as fluorescent lights. The peat medium should be prepared about three weeks in advance to allow a plentiful culture of small soil organisms to develop. The young pygmy Droseras will capture these for nutriment and grow faster and better for it. They will mature in about six months in this environment, and given the proper conditions are able to in turn produce gemmae of their own at that time.

Humidity is not essential for gemmae production nor is the amount of watering an important factor. Warming of the peat by sunlight causes no harm either since pygmy Droseras often grow in sands in the wild that are too hot to walk on barefoot. Peat seems to be the best all around medium in my experience.

Gemmae are of different shape, size and color (lighter to darker shades of green) depending on species. D. paleacea gemmae are spherical to oval and light green. D. pulchella gemmae are flat discs resembling small fish scales and dark green. Stipules may or may not disappear during gemmae production depending on the individual or species.

After all the large, ripe gemmae are removed from an apex, more will be produced for several crops as long as proper conditions are maintained. Extreme care and patience are required